UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/784,838	02/23/2004	Richard A. Johnson	SILA:199	1480

7590 06/05/2006

Brian W. Peterman
O'KEEFE, EGAN & PETERMAN
Building C, Suite 200
1101 Capital of Texas Highway South
Austin, TX 78746

EXAMINER	
LE, LANA N	

ART UNIT	PAPER NUMBER
2618	

DATE MAILED: 06/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/784,838	JOHNSON, RICHARD A.	
	Examiner	Art Unit	
	Lana N. Le	2618	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ____ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 2/23/04

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-46 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-46 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-2, 5-6, 13, 22, 29-30, and 37 are rejected under 35 U.S.C. 102(b) as being anticipated by Stone et al (US 5,251,218).

Regarding claim 1, Stone et al disclose a tuner (figs. 1, 3) comprising:

a direct digital frequency synthesizer (111; fig. 3) having an output terminal for providing a digital local oscillator signal (digital LO outputs) having a frequency chosen to mix a channel to a desired frequency (col 5, lines 32-41); and

a mixer (119, 121) having a first input terminal for receiving a radio frequency signal (Rs), a second input terminal (cos, sin) coupled to the output terminal of the direct digital frequency synthesizer (111), and an output terminal for providing an output signal (I, Q) at a desired frequency (fig. 3) (col 5, lines 10-35).

Regarding claim 29, Stone et al disclose a method of tuning comprising the steps of:

generating a digital local oscillator signal (LO outputs) having a frequency chosen to mix a channel to a desired frequency (col 5, lines 32-41); and

a mixer (119) having a first input terminal for receiving a radio frequency signal (Rs), a second input terminal (cos) coupled to the output terminal of the direct digital frequency synthesizer (111), and an output terminal for providing an output signal (I) at a desired frequency (fig. 3) (col 5, lines 10-35).

Regarding claims 2 and 30, Stone et al disclose the tuner and method of tuning of claims 1 and 29 respectively, wherein the desired frequency of the output signal is at baseband (col 4, lines 65 – col 5, line 4; col 6, lines 58-64).

Regarding claim 5, Stone et al disclose the tuner of claim 4, wherein the radio frequency signal represents a radio band signal (col 3, lines 11-17).

Regarding claim 6, Stone et al disclose the tuner of claim 5, wherein the radio band signal is an FM radio signal (col 3, lines 11-17).

Regarding claims 13 and 37, Stone discloses the tuner and method of tuning of claims 1 and 29 respectively, wherein the direct digital frequency synthesizer (111) further comprises an input terminal for receiving a tuning signal (control input) corresponding to a desired channel and is configured to provide the digital local oscillator signal (cos, sin outputs) at a frequency determined at least in part by the tuning signal (col 5, lines 32-41).

Regarding claim 22, Stone et al disclose the tuner of claim 21, further comprising a second mixer (121) having a first input terminal for receiving the radio frequency signal (Rs), a second input terminal (input terminal to receive signal from 111), and an output terminal for providing a quadrature signal (Q), wherein the direct digital frequency synthesizer (111) further has a second output terminal coupled to the second input

terminal of the second mixer for providing for providing a phase-shifted digital local oscillator signal (sin LO output).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 4 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stone et al (US 5,251,218) in view of Birleson et al (US 6,177,964).

Regarding claims 4 and 32, Stone et al disclose the tuner and method of tuning of claims 1 and 29 respectively, wherein Stone et al do not specifically disclose the radio frequency signal comprises a plurality of channels and wherein the desired frequency of the output signal is greater than three channel widths. However, it is notoriously old and well known in the art to have the desired frequency be greater than three channel widths as in high or regular intermediate frequencies as taught by Bireleson et al (col 8, lines 10-12). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have the frequency be greater than three channel widths in order to convert the received RF signal to an appropriate intermediate frequency.

4. Claims 7, 27-28, 33, 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stone et al (US 5,251,218) in view of Tomasz et al (US 2001/0,041,532).

Regarding claims 7 and 33, Stone et al disclose the tuner and method of tuning of claims 1 and 29 respectively, wherein Stone et al do not disclose the direct digital frequency synthesizer and the mixer are combined in a single integrated circuit. Tomasz et al disclose the direct digital frequency synthesizer (500) and the mixer (124, 126) are combined in a single integrated circuit (120); (fig. 7; para. 22). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the mixer and synthesizer combined in an integrated circuit in order to reduce the size of the downconverter circuit for compactness.

Regarding claims 27 and 45, Stone et al and Tomasz et al disclose the tuner and method of tuning of claims 7 and 33 respectively, wherein Stone et al disclose the radio frequency signal represents a radio band signal (col 3, lines 11-17).

Regarding claims 28 and 46, Stone et al and Tomasz et al disclose the tuner and method of tuning of claims 27 and 45 respectively, wherein Stone et al disclose the radio band signal is an FM radio signal (col 3, lines 11-17).

5. Claims 3 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stone et al (US 5,251,218) in view of Cowley (US 2002/0,177,423).

Regarding claims 3 and 31, Stone et al disclose the tuner and method of tuning of claims 1 and 29 respectively, wherein Stone et al do not disclose the radio frequency signal (Rs) comprises a plurality of channels and wherein the desired frequency of the

output signal is less than or equal to three channel widths. Cowley discloses the radio frequency signal comprises a plurality of channels and wherein the desired frequency of the output signal is less than or equal to three channel widths (para. 31). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the desired frequency be less than or equal to three channel widths in order to provide a low intermediate frequency signal to align the tuner onto a desired channel centered on a low intermediate frequency as suggested by Cowley.

5. Claims 18, 20, 38, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stone et al (US 5,251,218) in view of Sakamoto (US 4,361,906) and further in view of Oosawa et al (US 2005/0,239,499).

Regarding claims 18 and 38, Stone et al disclose the tuner and method of tuning of claim 7 and 33 respectively, wherein Stone et al do not disclose the tuner comprises at least an additional receive path comprising: a second direct digital frequency synthesizer having an output terminal for providing a digital local oscillator signal having a frequency chosen to mix a channel to a desired frequency; and a second mixer having a first input terminal for receiving a radio frequency signal, a second input terminal coupled to the output terminal of the second direct digital frequency synthesizer, and an output terminal for providing a second output signal at a desired frequency. Sakamoto discloses a tuner comprises at least the additional receive path (56, 29, 48,49-54, 31) comprising: a second direct digital frequency synthesizer (second PLL synthesizer; col 2, lines 45-58) having an output terminal for providing a digital local oscillator signal having a frequency chosen to mix a channel to a desired frequency; and a second mixer

(48) having a first input terminal for receiving a radio frequency signal (WsubRF), a second input terminal coupled to the output terminal of the second direct digital frequency synthesizer, and an output terminal for providing a second output signal at a desired frequency. Although Sakamoto do not disclose the second synthesizer is digital, it is well known and notoriously old in the art to have the synthesizer of Sakamoto digital as well in order to output digital oscillator signals to a digital mixer such as Stone et al's digital mixer to output signals in a complex domain. Stone et al and Sakamoto do not disclose one additional receive path on the single integrated circuit. Oosawa disclose one additional receive path on the single integrated circuit (para. 18; fig. 1). It would have been obvious to one of ordinary skill in the art at the time the invention was made to integrate the additional receive path in order to utilize a light and small multi band receiver with most of its functional components combined in an integrated circuit.

Regarding claims 20 and 40, Stone et al, Sakamoto and Oosawa disclose the tuner and method of tuning of claims 18 and 38 respectively, wherein Sakamoto discloses the first mixer (137, 143) and the second mixer receive a radio frequency signal in different frequency bands (col 9, lines 56-68).

6. Claims 19 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stone et al (US 5,251,218) in view of Sakamoto (US 4,361,906) and further in view of Oosawa et al (US 2005/0,239,499) and further in view of Yano et al (US 6,711,149).

Regarding claims 19 and 39, Stone et al, Sakamoto and Oosawa disclose disclose the tuner and method of tuning of claims 18 and 38 respectively, wherein the

Stone et al, Sakamoto and Oosawa do not disclose the first mixer and the second mixer receive a radio frequency signal within the same frequency band. Yano et al disclose the two receivers receive a radio frequency signal within the same frequency band (col 11, lines 22-29). It would have been obvious to one of ordinary skill in the art at the time the invention was made to receive within the same band in order to allow the receiver to receive simultaneously from two different remote stations as suggested by Yano et al.

7. Claims 21, 25 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stone et al (US 5,251,218) in view of Sakamoto (US 4,361,906).

Regarding claims 21 and 41, Stone et al disclose the tuner and method of tuning of claim 7 and 33 respectively, wherein Stone et al do not disclose the radio frequency signal represents a television signal. Sakamoto et al disclose the RF signal represents a television signal (col 1, lines 40-43). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the tuner of Stone et al tune a television signal in order to tune to a desired TV channel for the user.

Regarding claim 25, Stone et al disclose the tuner of claim 7, wherein Stone et al do not specifically disclose the tuner comprising an oscillator having a clock signal as an output, the mixer being configured to receive the clock signal and the direct digital frequency synthesizer being configured to receive the clock signal through a divider. Sakamoto discloses a phase locked loop comprising an oscillator (25) having a clock signal as an output, a mixer (48) being configured to receive the clock signal and the direct digital frequency synthesizer (18-22, 30-31) being configured to receive the clock signal through a divider (26). It would have been obvious to one of ordinary skill in the

art at the time the invention was made to have a clock signal in order to phase compare to lock the local clock source to the received timing information.

8. Claim 42 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stone et al (US 5,251,218) in view of Sakamoto (US 4,361,906) and further in view of Hedstrom (WO 97/06604).

Regarding claim 42, Stone et al disclose the tuner of claim 41, where Stone do not disclose the method where the desired frequency of the output signal is at baseband and further comprising converting the output signal from baseband to a predetermined center frequency utilizing a second digital local oscillator signal. Hedstrom discloses a method wherein the desired frequency of the output signal is at baseband (via 54, 58) and further comprising converting the output signal from baseband to a predetermined center frequency (via 132, 134) utilizing a second digital local oscillator signal.
It would have been obvious to one of ordinary skill in the art at the time the invention was made to convert the output of the first and second mixers to a predetermined frequency in order to provide further conversion to a desired frequency to detect a stronger signal.

9. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stone et al (US 5,251,218) in view of Hedstrom (WO 97/06604).

Regarding claim 23, Stone et al disclose the tuner of claim 22, where Stone do not disclose the tuner comprising a converter circuit configured to convert the output signals from the first and second mixers to a predetermined center frequency. Hedstrom discloses a converter circuit (132, 134) configured to convert the output signals from the

first and second mixers (54, 58) to a predetermined center frequency. It would have been obvious to one of ordinary skill in the art at the time the invention was made to convert the output of the first and second mixers to a predetermined frequency in order to provide further conversion to a desired frequency to detect a stronger signal.

10. Claims 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stone et al (US 5,251,218) in view of Staszewski et al (US 2003/0,083,033).

Regarding claim 34, Stone et al disclose the method of claim 29, wherein Stone et al do not disclose the mixing step comprises converting the radio frequency signal to at least one current signal; and mixing the at least one current signal with the output from the direct digital frequency synthesizer. Staszewski et al disclose a method for converting the radio frequency signal to at least one current signal and mixing the at least one current signal with the output from the direct digital frequency synthesizer. (para. 52, 101; figs. 11a, 14). It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the mixer of Stone et al with the mixer of Staszewski et al in order to reduce power consumption by generating clock signals that can be shared by the different signal paths.

Regarding claim 35, Stone et al and Staszewski et al disclose the method of claim 34, wherein Staszewski disclose the radio frequency signal, the current signal, and the output signal comprise differential signals (para. 73; figs. 11a, 14).

Regarding claim 36, Stone et al and Staszewski et al disclose the method of claim 34, wherein Staszewski et al disclose the converting step comprises generating a plurality of current signals using a plurality of transconductor cells (para. 101; fig. 14).

11. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stone et al (US 5,251,218) in view of Hedstrom (WO 97/06604).

Regarding claim 23, Stone et al disclose the tuner of claim 22, where Stone do not disclose the tuner comprising a converter circuit configured to convert the output signals from the first and second mixers to a predetermined center frequency. Hedstrom discloses a converter circuit (132, 134) configured to convert the output signals from the first and second mixers (54, 58) to a predetermined center frequency. It would have been obvious to one of ordinary skill in the art at the time the invention was made to convert the output of the first and second mixers to a predetermined frequency in order to provide further conversion to a desired frequency to detect a stronger signal.

12. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stone et al (US 5,251,218) in view of Hedstrom (WO 97/06604) and further in view of Birleson et al (US 6,177,964).

Regarding claim 24, Stone et al and Hedstrom disclose the tuner of claim 23, further comprising a second direct digital frequency synthesizer having an output coupled to the converter circuit. Birleson et al disclose a second direct digital frequency synthesizer (32) having an output coupled to the converter circuit (204). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a second synthesizer in order to separately control the local oscillator inputs.

13. Claim 43 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stone et al (US 5,251,218) in view of Tomasz et al (US 2001/0,041,532) and further in view of Sakamoto (US 4,361,906).

Regarding claim 43, Stone et al, Tomasz et al disclose the method of claim 33, wherein Stone et al and Tomasz et al do not disclose the method further comprising providing a reference clock signal and utilizing the reference clock signal in the generating and mixing steps. Sakamoto disclose the method comprising providing a reference clock signal (from reference oscillator 25) and utilizing the reference clock signal in the generating and mixing steps (col 2, lines 45-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a reference clock signal in order to phase compare to lock the local clock source to the received timing information.

14. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stone et al (US 5,251,218) in view of Sakamoto (US 4,361,906) and further in view of Staszewski et al (US 2003/0,083,033).

Regarding claim 44, Stone et al and Sakamoto disclose the method of claim 43, wherein Stone et al and Sakamoto do not disclose the mixing step comprises converting the radio frequency signal to M current signals, generating an M-bit digital signal from the digital local oscillator signal, and mixing the M current signals with the M-bit digital signal to provide the output signal at the desired frequency. Staszewski et al disclose a mixing step comprises converting the radio frequency signal to M current signals, generating an M-bit digital signal from the digital local oscillator signal, and mixing the M current signals with the M-bit digital signal to provide the output signal at the desired frequency (para. 52, 101; figs. 11a, 14). It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the mixing of Stone et al

with the mixing of Staszewski et al in order to reduce power consumption by generating clock signals that can be shared by the different signal paths.

Double Patenting

15. Claims 8-12 are rejected on the ground of nonstatutory double patenting over claims 1-5 of U. S. Patent No. 6,778,117 since the claims, if allowed, would improperly extend the "right to exclude" already granted in the patent.

The subject matter claimed in the instant application is fully disclosed in the patent and is covered by the patent since the patent and the application are claiming common subject matter, as follows:

the mixer comprises: a transconductance amplifier having an input terminal for receiving the radio frequency signal, and an output terminal for providing at least one current signal; and a mixing digital-to-analog converter having a first input terminal coupled to the output terminal of the transconductance amplifier, a second input terminal coupled to the output terminal of the direct digital frequency synthesizer, and an output terminal for providing the output signal at the desired frequency;

wherein the radio frequency signal, the current signal, and the output signal comprise differential signals; wherein the transconductance amplifier comprises a plurality of current cells; wherein the plurality of current cells is characterized as being binarily weighted and wherein the plurality of current cells include a first plurality of current cells characterized as being binarily weighted and a second plurality of current cells characterized as being equally weighted.

Furthermore, there is no apparent reason why applicant was prevented from presenting claims corresponding to those of the instant application during prosecution of the application which matured into a patent. See *In re Schneller*, 397 F.2d 350, 158 USPQ 210 (CCPA 1968). See also MPEP § 804.

16. Claims 14-17 and 34-36 are rejected on the ground of nonstatutory double patenting over claims 12, 17-19 and 23-25 of U. S. Patent No. 6,778,117 since the claims, if allowed, would improperly extend the "right to exclude" already granted in the patent.

The subject matter claimed in the instant application is fully disclosed in the patent and is covered by the patent since the patent and the application are claiming common subject matter, as follows:

a mixer wherein each cell comprises a current source having first and second terminals, the current source having a size proportional to an order of the cell and generating an output current proportional to a voltage applied at the second terminal; a modulation circuit configured to modulate a voltage at the first terminal of the current source in response to a received voltage signal; and a selection circuit configured to selectively divert the output current between the first output terminal and a second output terminal in response to a bit of a digital local oscillator signal having an order corresponding to an order of the cell, wherein the first output terminal comprises a single-ended output signal and the second output terminal comprises a reference voltage terminal, wherein the first and second output terminals together form a differential output signal of the mixer and a second current source having first and

second terminals, the second current source having a size proportional to the order of the cell and generating an output current proportional to a voltage applied at the second terminal; means for modulating a voltage at the first terminal of the second current source in response to a second received voltage signal; and means for selectively diverting current between the second output terminal and the first output terminal respectively in response to the bit and a complement of the bit.

17. Claims 29-30, and 37 are rejected on the ground of nonstatutory double patenting over claims 20-21 and 22 of U. S. Patent No. 6,778,117 since the claims, if allowed, would improperly extend the "right to exclude" already granted in the patent.

18. Claims 1-2 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1 and 11 of copending Application No. 10/377,573. This is a provisional obviousness-type double patenting rejection.

19. Claim 44 is rejected on the ground of nonstatutory double patenting over claims 23 of U.S. Patent No. 6,778,117 since the claims, if allowed, would improperly extend the "right to exclude" already granted in the patent.

Conclusion

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lana N. Le whose telephone number is (571) 272-7891. The examiner can normally be reached on M-F 9:30-18:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward F. Urban can be reached on (571) 272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lana Le

Lana N. Le
5-24-06

LANA LE
PRIMARY EXAMINER